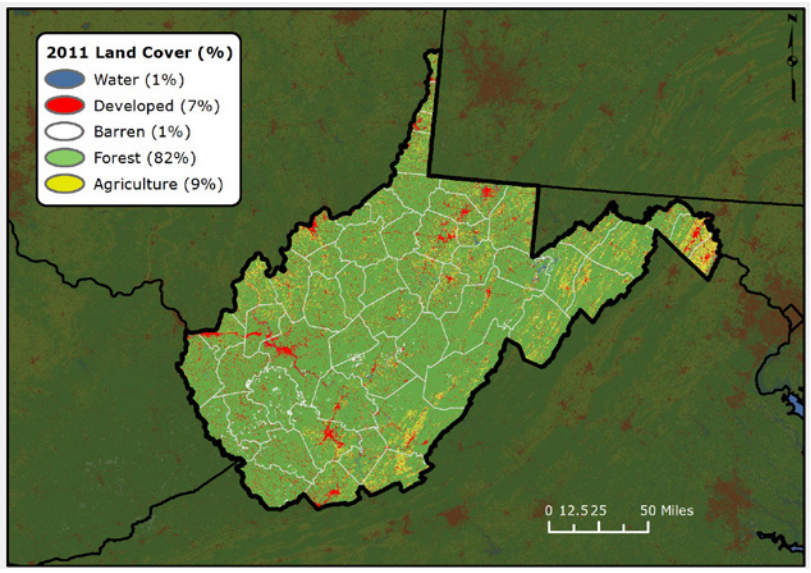
USDA United States Department of Agriculture

2017 Forest Health WEST VIRGINIA *highlights*

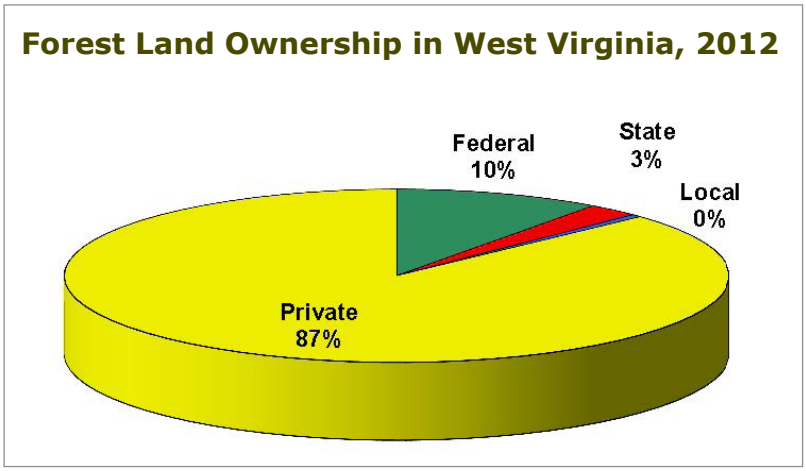
Forest Resource Summary

The West Virginia landscape is dominated by more than 11.8 million acres of forest. Due in large part to the State's varied topography, the forest is a rich diversity of oaks, hickories, spruce, pines, and the West Virginia State Tree—sugar maple. Ninety percent of all forests in West Virginia are privately owned, but there are 8 State forests, 34 State parks, and 87 wildlife management areas that provide public enjoyment.



Forest Stewardship

The West Virginia Division of Forestry administers the Forest Management Program. The intent of the program is to help private, nonindustrial forest landowners improve their forests by managing them in a sound, scientific manner. Within this program, the Forest Stewardship Program offers a forest management plan written by a professional forester based on the landowner's objectives. Other programs (Environmental Quality Incentives Program and Conservation Reserve Enhancement Program) provide financial assistance for recreation,

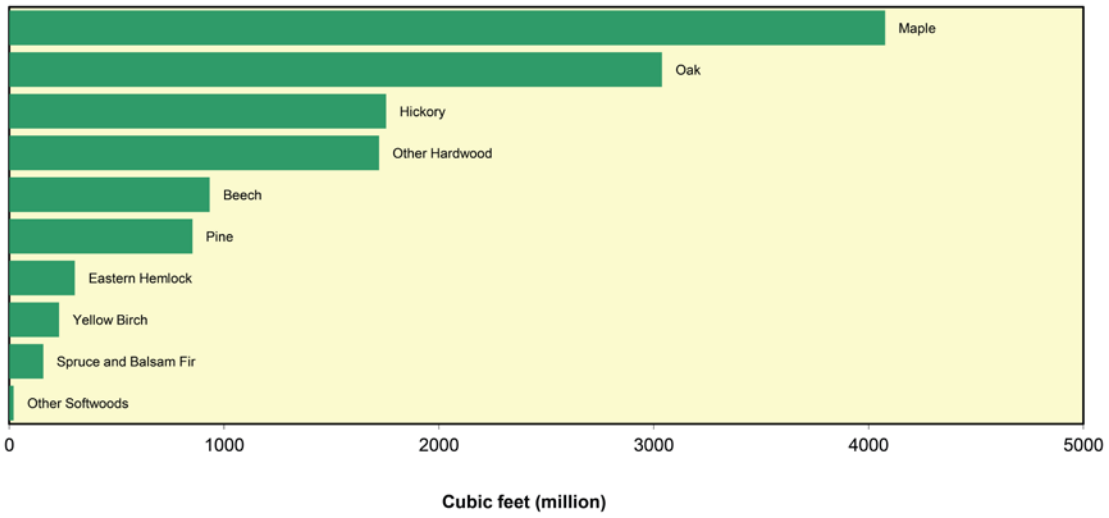


Forest Service
Northeastern Area
State and Private Forestry

West Virginia Department of Agriculture

May 2018

Net Volume of Growing Stock on Timberland by Species in West Virginia, 2012

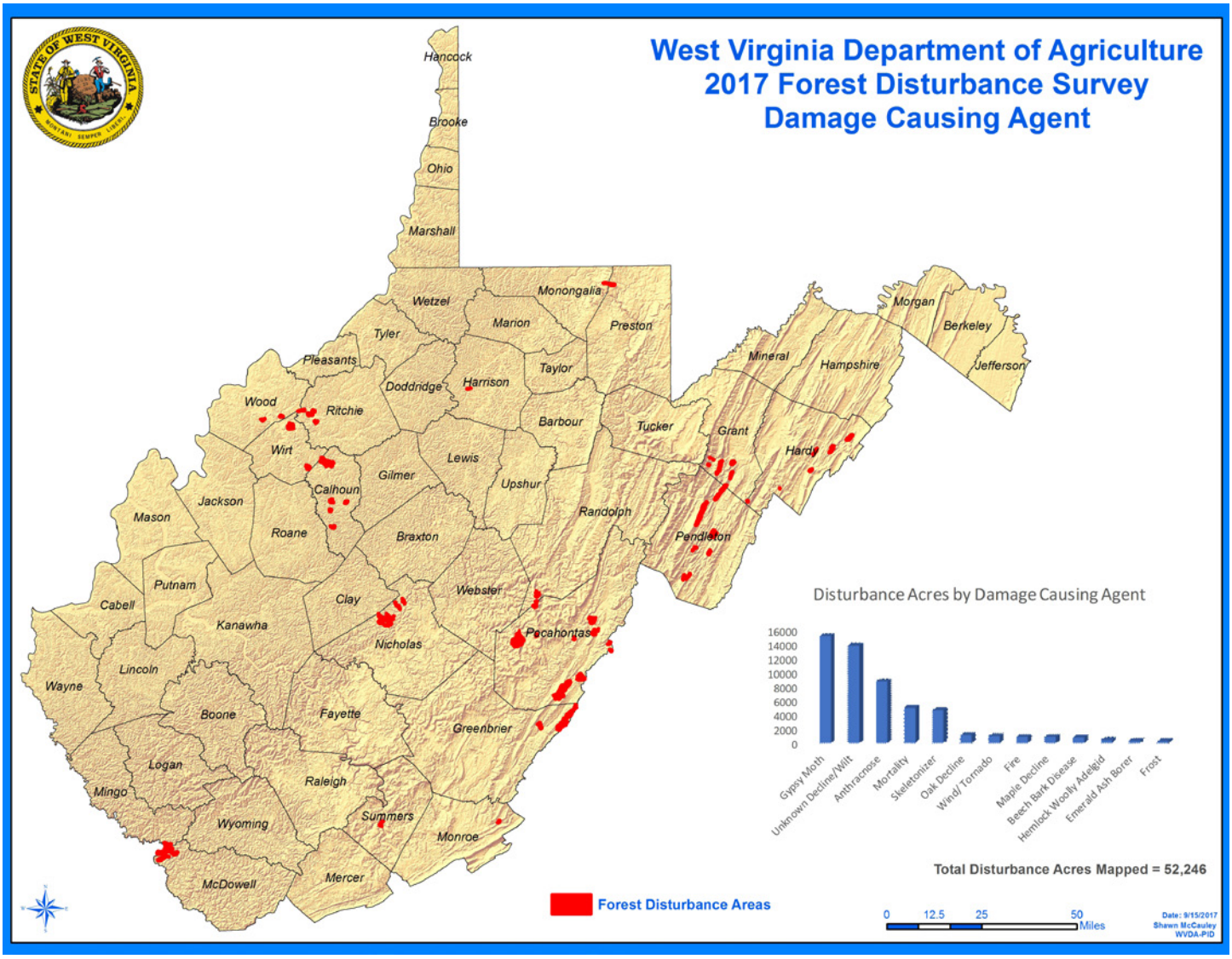


forest improvement, soil and water protection, wetlands protection, fisheries habitat enhancement, wildlife habitat enhancement, tree planting, and improvement of forest roads. In FY 2017, 58 stewardship plans were completed for a total of 7,268 acres. Currently 154,105 acres are managed under stewardship plans.

Forest Health Surveys

In 2017, the West Virginia Department of Agriculture (WVDA) continued using the Forest Disturbance Monitor to identify, survey, collect, and report large forest disturbances across the State. This application has replaced traditional aerial surveys for finding defoliation. A total of 52,246 acres were reported showing some type of damage, and all areas were verified by site visits.

Damage-Causing Agent	Acres Damaged by Agent
Gypsy Moth	15,021
Unknown Decline/Wilt	13,675
Anthracnose	8,644
Mortality	4,915
Skeletonizer	4,588
Oak Decline	1,093
Wind/Tornado	942
Fire	840
Maple Decline	834
Beech Bark Disease	751
Hemlock Woolly Adelgid	408
Emerald Ash Borer	278
Frost	256
Grand Total	**52,246**



WVDA 2017 Forest Disturbance Survey Damage Causing Agent.

Special Issues

Gypsy Moth Program

The objectives of the WVDA Gypsy Moth Program are to continue to minimize the adverse impact of gypsy moth on forest resources, preserve aesthetic values, protect people from the annoyance and health problems that can occur when in contact with large numbers of gypsy moth caterpillars, and slow the spread of gypsy moth by reducing populations on the advancing front.

Gypsy Moth Quarantine

West Virginia currently has 44 counties regulated and considered generally infested by gypsy moth. The WVDA regulates the movement of articles out of these counties into nonquarantined counties or States. There were no new counties quarantined in 2017.

Gypsy Moth Regulatory Treatments

There were no regulatory insecticide treatments in West Virginia in 2017.

Staff visited 78 sites to investigate the movement of articles capable of transporting gypsy moth into uninfested areas. Areas visited included Christmas tree sales lots, plant nurseries, mobile home dealers, campgrounds, firewood producers, interstate weigh stations, log yards, sawmills, and relative trade shows.

Gypsy Moth Population

West Virginia's gypsy moth population in 2017 is low in most areas of the State. The highest populations are in the eastern counties of Hardy, Grant, Nicholas, and Pendleton where treatments are expected for 2018. The fungus *Entomophaga maimaiga* caused a moderate collapse in the gypsy moth population in some areas. This limited the amount of defoliation, but populations remain high enough to cause defoliation in 2018. Gypsy moth defoliated a total of 15,021 acres in 2017. Defoliation is expected in the eastern portion of the State in 2018.

Gypsy Moth Cooperative State County Landowner (CSCL) Program

WVDA staff are currently responding to landowner requests and completing surveys on forested lands in West Virginia to determine areas at risk for gypsy moth defoliation and/or mortality in the spring of 2018. Staff are currently using 1/40-acre plot surveys to determine areas at risk and plan to have surveys completed by late December.

Larval insecticide treatments were conducted on 2,923 acres in the CSCL program in 2017. Mimic and *Btk* were used to treat blocks in Grant, Hardy, Pendleton, Pocahontas, and Summers Counties.

The CSCL program covered three quarters of the State in 2017.

Gypsy Moth Slow the Spread

In West Virginia, the Slow the Spread (STS) Action Area covered approximately 3,506,255 acres, while the 5k and 8k Monitoring Areas covered 5,989,309 acres. The 2k- and 3k-base grids were set with delta traps. Milk carton traps were used within the 5k and 8k Monitoring Areas. Both milk carton and delta traps were used within the 500m and 1k intensive grids. A total of 3,607 traps were proposed across West Virginia and a total of 3,607 traps were set. The WVDA trapped 31,406 male gypsy moths in 2017 compared to 34,060 in 2016. Populations seem to be lower across the north and north-central STS areas with increased catch in the central areas of both the 5k and 8k monitoring zones.

2017 Gypsy Moth Traps by Trapping Grid

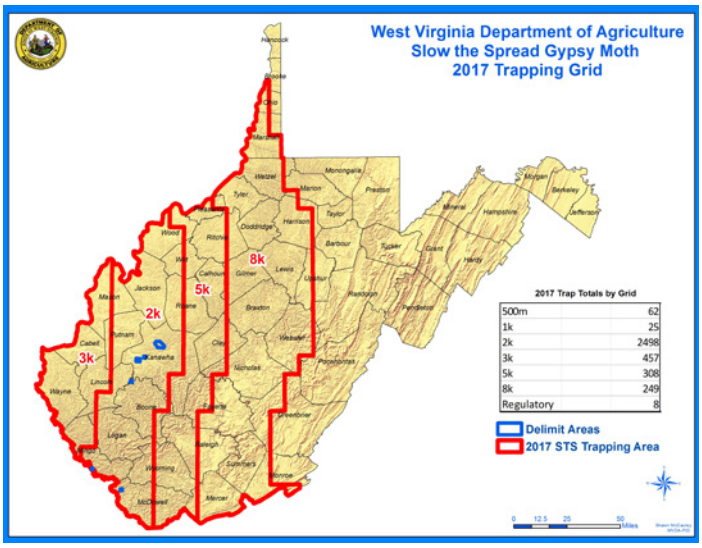
Grid	Proposed	Omits	Set
500m	62	0	62
1k	25	0	25
2k	2,498	0	2,498
3k	457	0	457
5k	308	0	308
8k	249	0	249
WV Regulatory	8	0	8
Totals	**3,607**	**0**	**3,607**

2017 Gypsy Moth Traps by Project Boundary

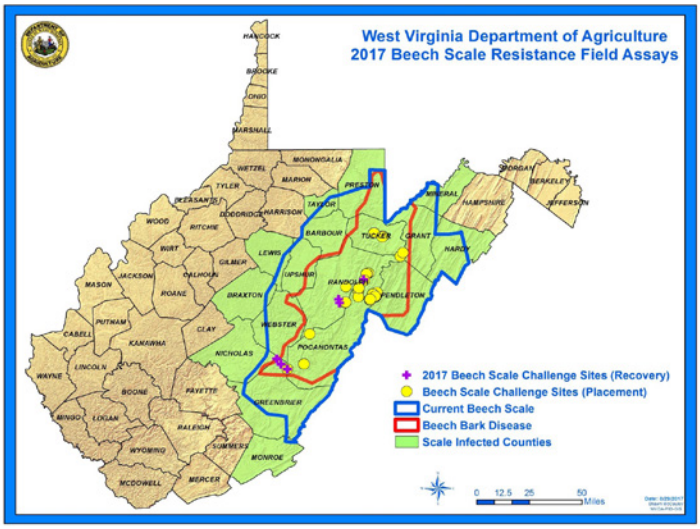
Project boundary	Proposed	Omits	Set
STS Action Area	3,048	0	3,048
STS Monitoring	559	0	559
Random	0	0	0
Totals	**3,607**	**0**	**3,607**

2017 Gypsy Moth Traps by Trap Type

Trap type	Proposed	Omits	Set
Delta Traps	3,050	0	3,050
Milk Cartons	557	0	557
Random	0	0	0
Totals	**3,607**	**0**	**3,607**



WVDA Slow the Spread Gypsy Moth 2017 Trapping Grid.


West Virginia Department of Agriculture
2017 Beech Scale Resistance Field Assays
2017 Beech Scale Challenge Sites (Recovery)
Beech Scale Challenge Sites (Placement)
Current Beech Scale
Beech Bark Disease
Scale Infected Counties

WVDA 2017 Beech Scale Resistance Field Assays.

Forest Health Protection Programs

Diseases

Beech Scale Resistant Assays on the Monongahela National Forest

In 2017, WVDA staff collected challenge pads from the 2016 challenges (37 scale challenges on putatively resistant trees and challenged 10 susceptible control trees), which were a redo of the 2014 challenges except for three of those trees since there weren't enough viable scale eggs to finish the challenges. There was similar success with the challenges this year as last year due to continued use of barbed wire around the pads to protect against bear damage. However, some controls did not work. This is in part due to the fact that these challenges are occurring in the aftermath zone where scale populations are low due to the lack of a healthy beech resource for them to survive on. The wet weather could have played a role in the lack of scale establishment as well. However, some control trees did develop a healthy scale population. These putatively resistant trees have also been tested against high scale pressure and disease over the years, especially through the active killing front stage. The fact that they are in groups together (related) implies that they are not escapes and are indeed resistant to beech scale.

Resistant Beech Planting

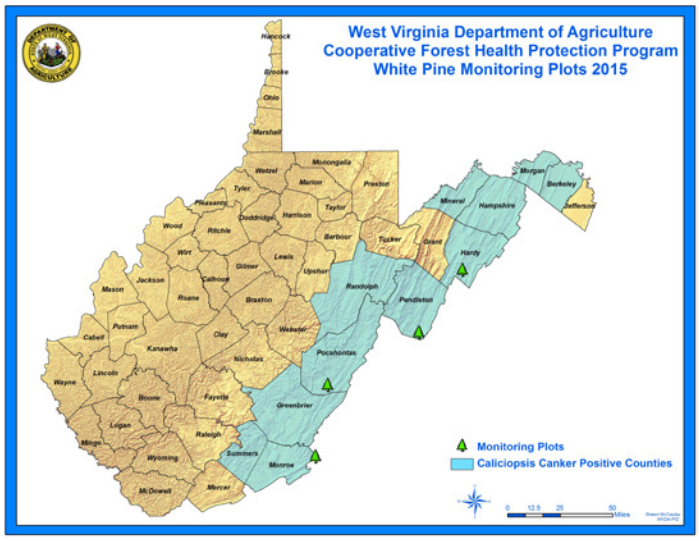
Seventy-eight resistant beech trees were planted at the resistant beech orchard at the U.S. Forest Service Timber and Watershed Laboratory in Parsons, WV. These were added to the 10 beech trees that were planted in 2015. Unfortunately, approximately 33% mortality occurred. After investigating the issue, it was concluded that the principal cause of mortality appeared to be related to two main types of frost/cold: (1) frost/cold kill before leaf out, and (2) frost/cold kill after leaf out (could also be a root rot, which is difficult to distinguish at this point).

Aerial view of the resistant beech orchard in Parsons, WV.

White Pine Monitoring

Monitoring plots were established in West Virginia and Virginia in 2012 to assess changes in live and dead volume of white pine. Most sites consisted of uneven-aged, mixed oak-pine stands. Two sites were even-aged pine plantations.

- Because no large trees within the plots had died during the study to date, no significant changes in volume were evident. However, mortality in sapling and pole-sized trees appeared elevated.
- Density-dependent mortality associated with natural stand self-thinning was distinguished from density-independent mortality associated with the scale-pathogen complex by establishing a baseline mortality for white pine age cohorts.
- Baseline mortality for each 2-cm diameter class was estimated to be approximately 12% based on the aggregate study site data, and 13-14% based on Forest Inventory and Analysis data.
- Observed mortality within plots was then compared to baseline mortality using chi-square analysis. During the initial measurement years, observed mortality was significantly greater than baseline mortality for only the 4-6 cm diameter class.
- After 5 years of monitoring, observed mortality was significantly greater than baseline mortality for five diameter classes: 4-6, 6-8, 8-10, 14-16, and 24-26 cm.
- The two smallest diameter classes of these five had observed mortality of more than 30%, on average, while the other three classes averaged more than 20% mortality. If these trends continue over time, white pine abundance or sustainability could eventually be compromised as mature trees gradually die and fewer cohorts of young trees are available to replace them.

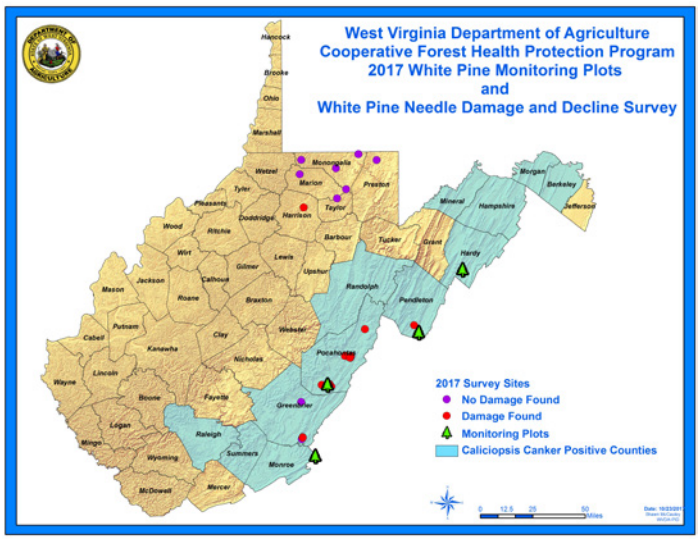

West Virginia Department of Agriculture
Cooperative Forest Health Protection Program
White Pine Monitoring Plots 2015
Monitoring Plots
Caliciopsis Canker Positive Counties

Location of four white pine monitoring plots and West Virginia counties that had positive identifications of the Caliciopsis *canker in 2015.*

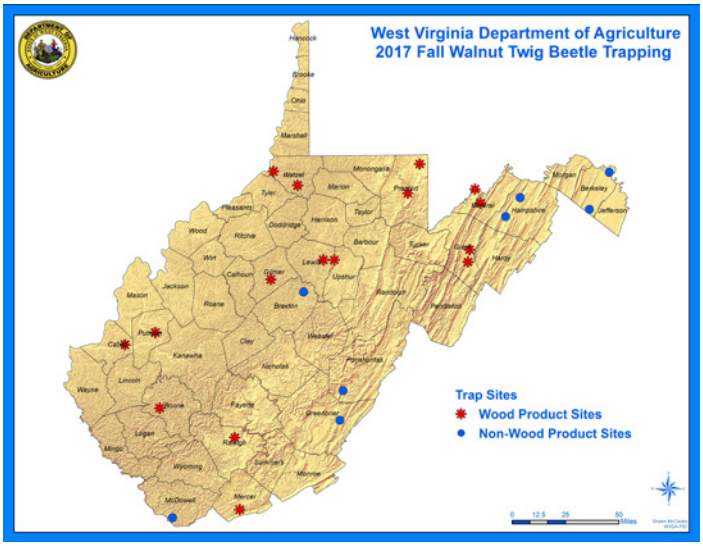
White Pine Needle Damage/Decline

White pine in West Virginia is struggling to maintain its health in other areas as well. Disease issues aside from *Caliciopsis* canker have emerged in the past few years either due to favorable weather conditions, poor site quality, and/or overstocking in some areas. White pine needle damage (WPND) due to needle cast/blight diseases has been causing defoliation and decline in white pine in West Virginia. These outbreaks are most likely due to wet spring weather, which favors disease development, over consecutive years. This issue of white pine decline is also plaguing the Northeast, Southeast, and the Great Lakes States.

Symptoms of WPND include the chlorosis (yellowing) of second- and third-year foliage in late May and early June. Following this brief period of yellowing, infected needles are cast in a defoliation process beginning in mid-June and often observed persisting into July. During the summer needle cast, the current-year needles are not yet fully elongated, but appear healthy. Symptoms are most often prevalent on the lower portions of the crown due to the rain-dispersed nature of the pathogens.



Location of white pine monitoring plots and 2017 survey sites for white pine needle damage and decline.



WVDA 2017 Fall Walnut Twig Beetle Trapping.

The premature loss of foliage represents a 4-month period of the growing seasoning in which infected pines exhibit substantially thinned crowns. The WPND complex is occurring in the eastern part of West Virginia in conjunction with *Caliciopsis* canker of white pine.

Walnut Twig Beetle Trapping

Fall trapping for the walnut twig beetle, the vector of thousand cankers disease, was completed and samples screened. Thirty traps were set and were monitored for 4 weeks. The traps were focused around wood product industries, campgrounds, and parks. Traps were serviced every 1 to 2 weeks depending on the amount of rain that fell during the trapping period. The WVDA Forest Pathologist and Cooperative Forest Health Protection Specialist processed and screened all samples. Samples screened to date are negative for the walnut twig beetle.

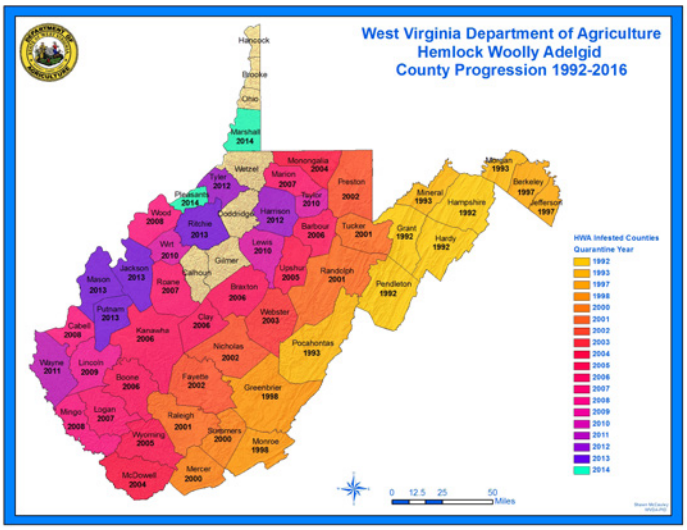
National Plant Protection Laboratory Accreditation Program

Personnel from the WVDA, Plant Industries Division, Plant Pathology Laboratory participated again in the National Plant Protection Laboratory Accreditation Program at the USDA Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Center for Plant Health Science and Technology. WVDA Plant Pathology Laboratory personnel were accredited in 2017 to perform validated diagnostic tests for *Phytophthora ramorum* (causal agent of sudden oak death).

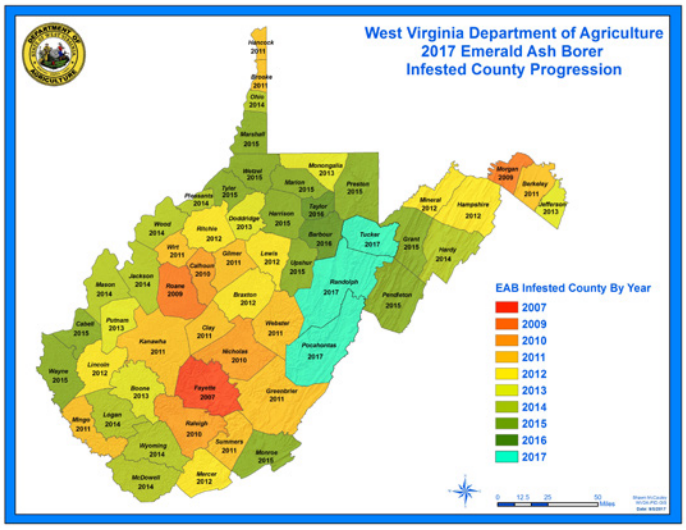
Insects

Hemlock Woolly Adelgid

Hemlock woolly adelgid (HWA) can now be found in 48 West Virginia counties. WVDA continued to treat high-value and high-visibility infested hemlocks with imidacloprid by inserting CoreTect™ tablets into the soil and injecting trunks. In 2017, 457 hemlocks were treated on State lands. Previous release sites of *Laricobius nigrinus* were monitored for predator survival and impact on HWA.



WVDA Hemlock Woolly Adelgid County Progression 1992–2016.



WVDA 2017 Emerald Ash Borer Infested County Progression.

Resistant Hemlock Planting

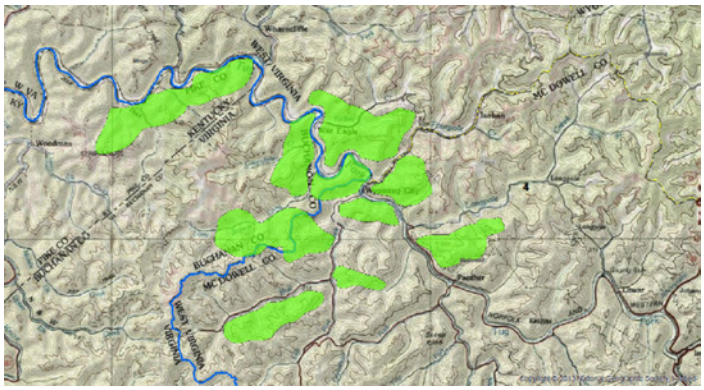
WVDA was one of nine agencies to receive hemlock saplings that are potentially resistant to HWA. These "bullet proof" hemlocks are from a stand of hemlocks in New Jersey that have been monitored for the past decade and appear to have a certain level of resistance to the invasive pest. This project is funded by the U.S. Forest Service and is a cooperative effort with State agencies in the Northeastern United States. The 10 putatively resistant trees were planted at Kanawha State Forest in October 2015; as of this writing, 9 of the 10 trees have survived. The hemlocks were inoculated with adelgid in the spring of 2017 and continue to be adelgid free.

Emerald Ash Borer

Three new counties (Tucker, Randolph, and Pocahontas) have been confirmed positive for emerald ash borer (EAB). All 55 counties in West Virginia are now infested with EAB.

Oak Skeletonizer

Damage to red oaks was reported in McDowell and Wyoming Counties in southern West Virginia and in Hardy County in the Eastern Panhandle in late summer of 2017. The damage consisted mainly of skeletonized leaves, resulting in some defoliation. The damage was caused by the red oak skeletonizer, *Bucculatrix ainsliella*. Populations of the oak skeletonizer vary greatly from year to year due to natural factors such as predators, parasites, and weather. Several successive years of defoliation can lead to reduced tree growth and some crown dieback, but at this time it is not a concern for West Virginia.



Areas damaged by oak skeletonizer in 2017.

Forest Fire

Wildfire suppression is one of the most important activities of the West Virginia Division of Forestry. In FY 2017, Division of Forestry personnel and volunteers fought 576 wildfires that burned 7,566 acres. These fires caused $2.26 million in damage to the natural resources of West Virginia and more

than $65,000 in personal property loss. The number of fires and acreage burned was significantly below the 10-year average. Debris burning and incendiary were the leading causes of forest fires, accounting for about 90% of the total number of fires. Incendiary caused 155 fires that burned the most acreage, more than 5,600 acres, which was 74% of the total number of acres burned. Debris burning caused 156 fires that burned more than 2,800 acres. The total number of fires in FY 2017 was 23% less than the 5-year average, and the acreage burned was 50% of the 5-year average.

References

Land Cover Map:

Jin, S.; Yang, L.; Danielson, P.; Homer, C.; Fry, J.; Xian, G. 2013. A comprehensive change detection method for updating the National Land Cover Database to circa 2011. Remote Sensing of Environment, 132: 159 – 175. http://www.sciencedirect.com/science/article/pii/S0034425713000242. (1 March 2016).

Forest Land Ownership:

Oswalt, Sonja N.; Smith, W. Brad; Miles, Patrick D.; Pugh, Scott A. 2014. Forest resources of the United States, 2012: a technical document supporting the Forest Service update of the 2010 RPA Assessment. Gen. Tech. Rep. WO-91. Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office. Table 2. http://www.fs.fed.us/sites/default/files/media/types/publication/field_pdf/GTR-WO-91.pdf. (1 March 2016).

Net Volume of Growing Stock on Timberland by Species:

Oswalt, Sonja N.; Smith, W. Brad; Miles, Patrick D.; Pugh, Scott A. 2014. Forest resources of the United States, 2012: a technical document supporting the Forest Service update of the 2010 RPA Assessment. Gen. Tech. Rep. WO-91. Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office. Tables 23 & 24. http://www.fs.fed.us/sites/default/files/media/types/publication/field_pdf/GTR-WO-91.pdf. (1 March 2016).

All images and maps courtesy of the WVDA.

Forest Health Programs

State forestry agencies work in partnership with the U.S. Forest Service to monitor forest conditions and trends in their State and respond to pest outbreaks to protect the forest resource.

U.S. Department of Agriculture
Forest Service
Northeastern Area
State and Private Forestry
11 Campus Blvd., Suite 200
Newtown Square, PA 19073
https://www.fs.usda.gov/naspf/

Forest Health Protection
Northeastern Area
State and Private Forestry
180 Canfield Street
Morgantown, WV 26505
304–285–1545

West Virginia Department of Agriculture
Plant Industries Division
1900 Kanawha Boulevard
East Charleston, WV 25305
304–558–2212
https://agriculture.wv.gov/divisions/plantindustries/Pages/default.aspx

USDA is an equal opportunity provider, employer, and lender.